

Is the VSO word order canonical in Arabic? ERP Evidence

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Introduction

- Among the permissible word-orders in Standard Arabic, verb-initial VSO and subject-initial SVO orders are predominant.
- Generally, the VSO order is considered unmarked / canonical, with the SVO order being considered as marked.
- In a visual ERP study, we investigated the neural signatures of word-order differences in Modern Standard Arabic, and observed the effects at the object position.
- Our hypothesis at the object position was : -
 - If the VSO order is indeed canonical, additional processing costs should ensue in SVO order as opposed to VSO order.
 - Alternatively, if the two orders have the same status in the grammar, no additional processing costs should be observable in processing SVO.

Methods

- Participants: 30 right-handed native speakers of Arabic
- EEG data recorded at 25 Ag/AgCl scalp electrode sites; 250 Hz sampling frequency; left-mastoid online reference; re-referenced to the average of linked mastoids offline; AFZ ground electrode; 0.3 – 20 Hz band-pass offline filter
- Rapid serial visual presentation of stimuli, followed by a probe detection task after each sentence
- Transitive sentences in VSO, SVO, and Adverb-VO orders; the adverb in the subject-dropped AVO sentences was identical ('yesterday') in all sentences.
- All critical stimuli and fillers in the experiment were grammatical and well-formed sentences. Subjects and objects were all human singular nouns; the subject was always feminine, with which the verb agreed in person, number and gender; and the object was always masculine.
- Thus, there was no ambiguity at the position of the object (critical position) as to the objecthood of the noun.

Results

An example set of critical stimuli in the three word-orders.

VSO
 شتَمَت الممثلة المدخن في المقهى.
 ?l-maqhaa fii ?l-mudaxxin ?l-mumaθθil-a shatam-at
 [DEF-cafe] [in] [DEF-smoker]_{3sg,M} [DEF-actress]_{3sg,F} [insult]_{Past-3sg,F}
 'The actress insulted the smoker in the cafe'.

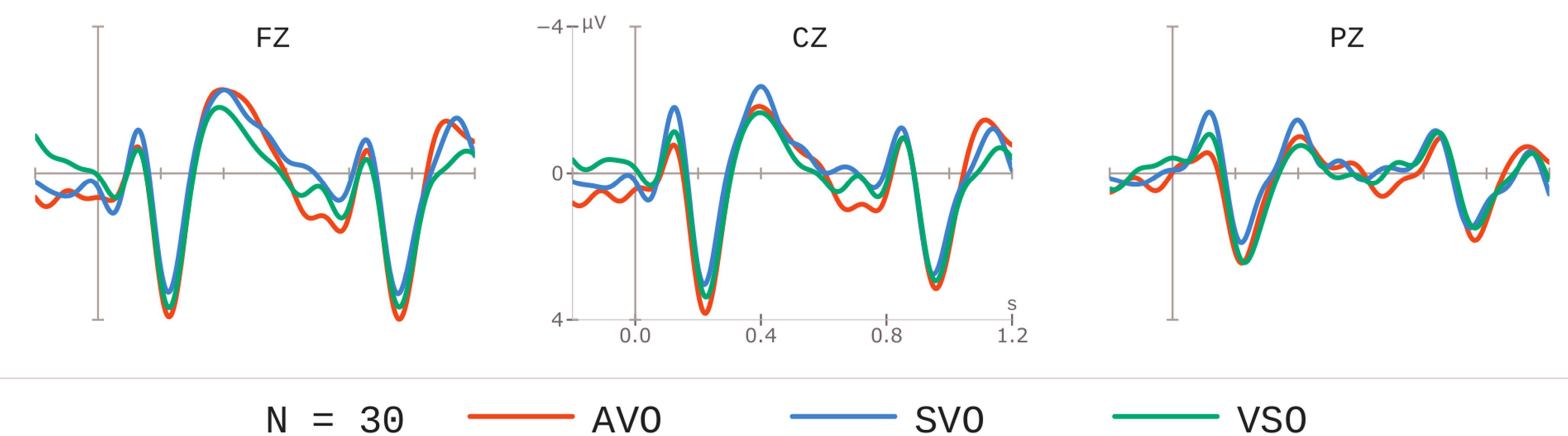
SVO
 الممثلة شتَمَت المدخن في المقهى.
 ?l-maqhaa fii ?l-mudaxxin shatam-at ?l-mumaθθil-a
 [DEF-cafe] [in] [DEF-smoker]_{3sg,M} [insult]_{Past-3sg,F} [DEF-actress]_{3sg,F}
 'The actress insulted the smoker in the cafe'.

AVO
 أمس شتَمَت المدخن في المقهى.
 ?l-maqhaa fii ?l-mudaxxin shatam-at ?ams
 [DEF-cafe] [in] [DEF-smoker]_{3sg,M} [insult]_{Past-3sg,F} [yesterday]
 'Yesterday, (she) insulted the smoker in the cafe'.

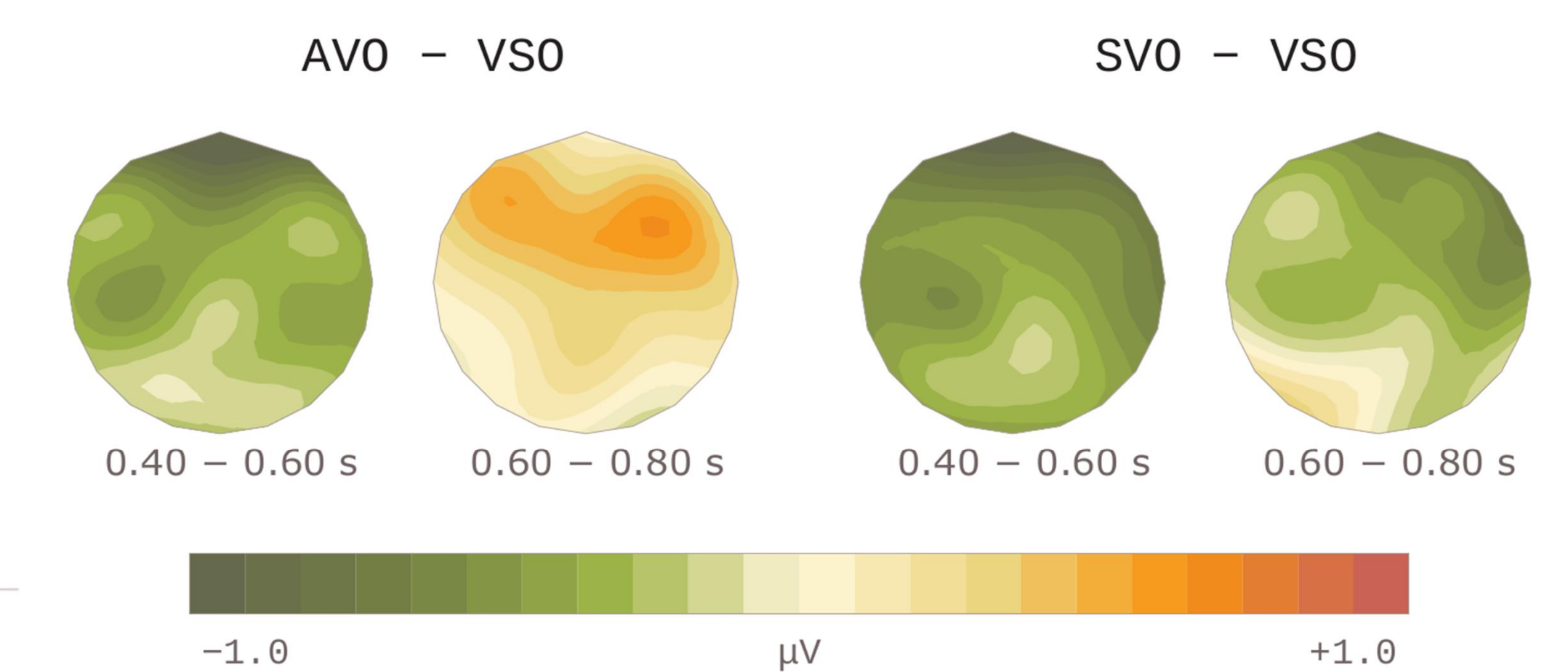
ERP results at the position of the object: -

- A negativity effect in the 400 to 600 ms time-window for the SVO & AVO conditions, as opposed to the VSO condition.
- A late-positivity effect in the 600 to 800 ms time-window for the AVO condition, as opposed to the VSO condition.
- Based on their topography and latency, these effects can be plausibly interpreted as instances of N400 and P600 respectively.
- Given that the pre-critical words and their categories were necessarily different in the three word-orders, we checked for possible upstream effects that might have played a role at the critical position.
- However, ERPs time-locked to the sentence onset for the entire epoch of the sentence and sentence-wide difference waves between the critical conditions showed that the critical effects at the position of the object are independent of effects from the pre-critical positions.
- In sum, the effects are such that the xVO conditions pattern together and show differences compared to the VSO condition.

ERPs at the position of the object noun in the three critical conditions.



Topographic map of effects



Discussion

- The negativity for SVO & AVO orders is in line with scrambling negativities found previously for processing non-canonical orders in German [1,2,3].
- The late-positivity for the AVO condition can be interpreted as reflecting the enriched composition of the inferred subject [4].
- Taken together, these results suggest that the verb-initial word-order may be canonical in Arabic, with even the adverb-initial AVO order being relatively less canonical.
- Our findings provide the first neurophysiological evidence for the canonical / central status of the VSO order in Arabic.

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